Research Article

The Association of Smartphone Addiction and Incidence of High Stress and Sleep Problems Among Young Population

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Abstract

Background: The prevalence of Smartphone usage is steadily rising, leading to the development of addiction like behavior underlying many health problems. This study examined the potential relationship between Smartphone addiction, incidence of stress and poor sleep among young population pursuing academics.

Method: The randomized control study was conducted among 356 University student respondents willing to take part in the study. The age and sex matched population were tested for Smartphone Addiction Scale-Short Version (SASSV) and Perceived Stress Scale (PSS), Pittsburgh Sleep Quality Index (PSQI).

Results: The Smartphone users were 98.87% among the young population (n=356), in which prevalence of Smartphone addiction was as high as 22.3%, where phone usage was more than 4 hours per day. The results showed mean age of population was 21.91± 1.99, the mean SASSV score was 18.26±4.68, phone usage was 6.5± 2.14, PSS score was 37.9±9.56 and PSQI score was 18.03±1.45. The phone usage pattern was, more than 50% for social media followed by online games, education tutorials and texting. The PSS score was high in female when compared to male students. The sleep quality was 2.5% lower for females and high in males. The study observed significant correlation between Smartphone addiction, perceived stress and poor sleep quality. Linear regression analysis revealed sleep quality was significantly affected by Smartphone addiction score and phone usage hours; other activities included in the study were academic performance, sports activity and parent's education.

Conclusion: The findings contribute valuable insights into the addictive nature of Smartphone usage among young population; this factor may develop mental stress and reduces sleep and may affect ones physical and mental health at very young age, the study also finds present lifestyle lack physical activities, among young population specially in females, which may be helpful in restoration of sleep.

Keywords: Sleep Cycle; Phone Addiction; Students; Stress; Academics; High Stress; Lifestyle

Introduction

Mobile phone dependence has been found to be an emerging public health concern [1]. There is need to recognize and identify the early symptoms, growing trends and negative consequences of uncontrolled mobile phone usage among young users [2]. The smartphone penetration stands 56.2% in urban and 43.8% in rural population of the country, where majority of users belong to young population. The social media, entertainment and gaming industry are most preoccupation among young people [3]. During the long exposure hours of digital screens, different health problems both mental and physical have been reported [4]. The excessive use of mobile/smart phones with loss of self-control for usage causes Smartphone phone addiction, a subtype of

impulse control disorder which shows symptom like anxiety, panic disorder, aggression, frequent burnout, headache, often neglected lately increase repercussions and may cause insomnia, migraine, headache, epilepsy, hypertension, obesity, lower HDL cholesterol, with high sympathetic arousal, cortisol imbalance etc. [5]. The studies related to Smartphone addiction in many countries have raised alarming concern. The phenomena of digital addiction at adolescences need to be understood and screen disorder should be analyzed with systemic and local factors [7]. The increased screen exposures have harmful consequences on growth and development of adolescent life [8]. Pocket friendly gadgets and internet use have become challenging to control excessive usage. The change in behavior pattern, social isolation and psychological impact needs to be analyzed in terms of technology addiction. The World Health Organization defines excessive cell phone use as an addiction by the characteristics of a felt need to use the mobile phone more and more to achieve the same desired effect, evidence of failed attempts to cut-down, preoccupation with the phone use, use of mobile phone to overcome anxiety and sadness, loss of time sense while using mobile phone, risking job or relationship for excess mobile phone use, tolerance and experiencing withdrawal in the form of irritability, anger, restlessness when not been able to use the mobile phone. It is suggested that presence of four or more of the above listed features indicates mobile addiction [9]. The screen addictions are similar to other substance use addictions when left unnoticed according to poor health management [10]. The development of technology revolutionized by the emergence of smart phones and easy accessibility of internet, the social existence had become virtual presence of individuals on social media, gaming and many other platforms. The recreation time spent on watching virtual content for information, entertainment and education has hooked people to their mobile phones. India is a country having highest youngest population of the world, had started facing the social problem of digital addiction disorder, to address the issue government has floated various interventions program in schools and colleges [11]. The study was conducted to find the relationship between Smartphone addiction and sleep quality and perceived stress in the young population concerning a major public health problem of future generation.

Material and Methods

Study Design

The observational study was performed between 2023 and 2024 in a random stratified sampling method, the participant enrolled were University students of the Gorakhpur district, Uttar Pradesh, India. According to previous studies on Smartphone addiction in other parts of country on young population, the prevalence was expected 50% [12]. A random sampling method was applied for the study, 356 students who were willing to take part were analyzed. The purpose of study was explained and written consent was taken before the scale test was conducted. Data on phone usage hours, pattern and other related information were collected in form of questionnaire. The three psychological test were administered in pen and paper mode with the help of volunteers under the guidance of Psychologist. The anonymity and confidentiality of the participants was maintained throughout the study. The inclusion criteria was usage of Smartphone usage more than six months and exclusion criteria was participants with history of neurological disease, substance abuse or any psychiatric or language disorder.

Screening of Psychological test: Smartphone addiction Scale (Short Version) (SAS-SV); the questionnaire was tested from respondents consisting of 10 items, measured in 6-point Likert scale [13]. The scale covers three domains of addictive nature, "intense desire" (3 questions), "withdrawal" (4 questions) and "impulsive control", "harmful use" and tolerance (1 question each), the total score range was 10-60. Screening of PSQI: The subjective sleep quality was evaluated using PSQI range 0 to 21 where higher scores were indicating poor sleep quality; sleep duration was screened based on rise time and bedtime on weekends and weekdays following School Sleep Habits Survey [14]. Screening of Perceived Stress Scale (PSS): The classic instrument developed in 1983, has 10 items with each measured on five-point Likert scale The PSS score was calculated in between 0 to 40 and categorized according to the range, low (0-13), moderate (14-26) and high stress perceived (26-40) [15].

Statistical Analysis

The data was entered in Microsoft Excel and analyses were done by using Statistical Package for the Social Sciences (SPSS) version-17 software. Data was expressed in terms of descriptive statistics; the categorical data was analyzed based on Pearson's Chi-Square test with 95% Confidence Interval (CI). Correlations and regression analysis were analyzed for each of the parameter [16]. Probability p-value of less than 0.05 was considered as statistically significant.

Results

The study examined 356 young participants with mean age (21.95±1.99) years, of whom 59% were female (n= 210). The participants using Smartphone more than four hours per day were considered at high-risk zone, the range of hours spent on Smartphone usage varied between three to eight hours per day, (Fig. 1). The mean phone usage hours for total population were (6.50±2.14), while the phone usage for male respondent was (5.49±1.66) and for female respondents was (4.25±1.23) (Table 1). The pattern phone usage included social media platforms, online gaming, online tutorials, online shopping and texting (Fig. 2). The Smartphone addiction was analyzed using Smartphone Addiction Score-Short version (SASSV), the mean value of SASSV score was 41.26±4.68 for the total population, no difference was observed between the SASSV score between male and female respondents. The sleep quality variable were assessed on respondents based on Pittsburgh Sleep Quality Index (PSQI) score, which showed reduced sleep hours (4 to 6 hours) while the normal sleep hours for healthy adults lies between 8 to 10 hours. The mean PSQI score was 7.03±1.45 and the mean PSQI score for male and female respondents were shown in Table 1. The mean value of Perceived Stress Scale (PSS) score was 27.9±9.56 for total population, the other demographic variable such as age, average academic percentage, average sports activity, i.e. hours spent playing outdoor sports within the academic course for a period of three years during graduation and five years for post graduation in any Indian University, their parents education was compared between male and female responds (Fig. 2) the academic score was high among females while sports activity performance was poor, the fathers education was similar in both the group, while mothers education was lesser in male respondent group than female (Fig. 3). The health of young population was seen as the standard Body Mass Index (BMI) of healthy young Indian adult fall between 18.5 and 22.9 kg/m², the BMI of each student was calculated according to their height and weight (Table 1). The PSQI score of high risk phone addiction group was compared to non addiction within males and females respondents, it showed statistical significant results at (p<0.0005) (Table 2). Similarly the stress scale was monitored on respondents with Perceive Stress Score (PSS); the value of PSS score was high in phone addiction group when compared with non addiction group.

The further analysis was performed to find the nature of relationship between phone addiction, sleep quality and stress level within the total young population under study, The evaluation between age, sleep quality (PSQI score) phone addiction (SASSV score) and stress (PSS score) was performed (Table 3). A weak significant, negative correlation between age and SAS-SV scores was observed, the analysis revealed significant results between other factors, in total population. A significant positive relationship showed between SASSV and PSQI score (Table 3). A statistical positive correlation was observed between SASSV score and PSS score (r=0.668 p<0.001). It was observed that significant positive correlation was present between PSQI score and PSS score (r= 0.272, p<0.001) also. The linear regression model was applied where age, sleep quality and stress were significantly affected by Smartphone addiction presented in (Fig. 4.).
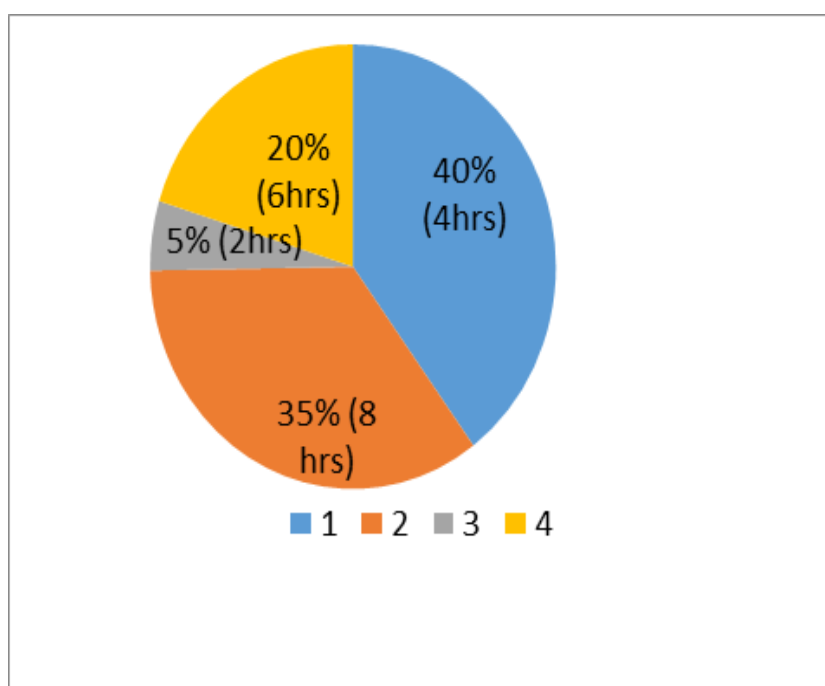

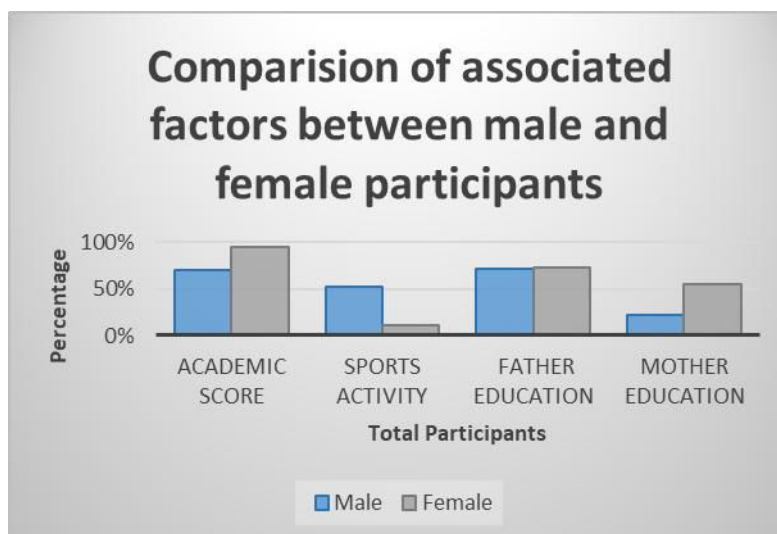**Figure 1:** Time spent on smartphone usage by respondent.

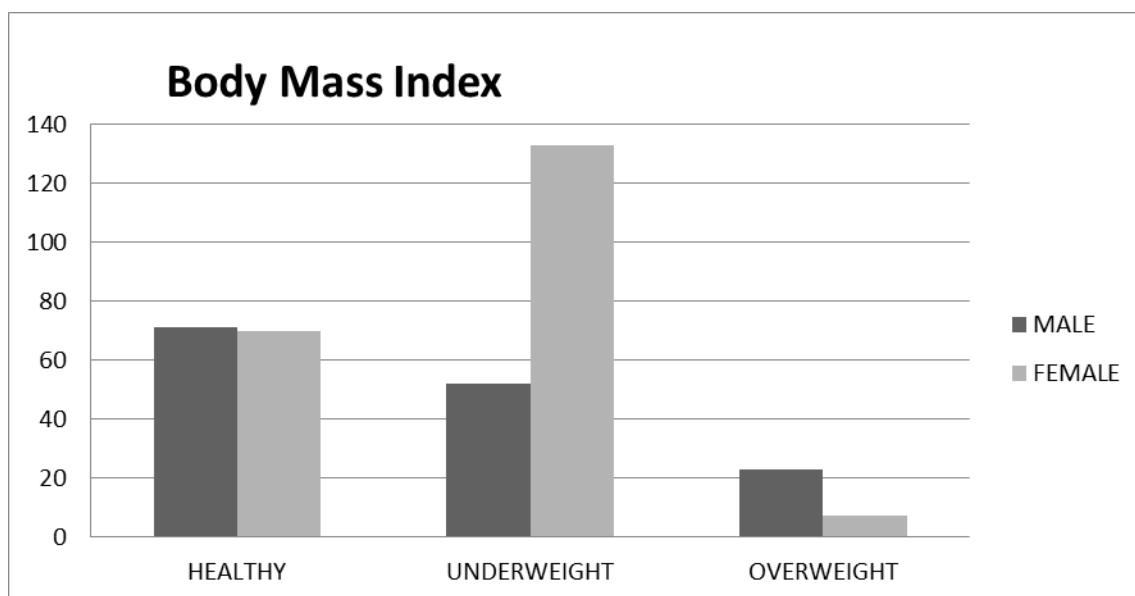**Figure 2:** Demographic variables between male and female respondents.

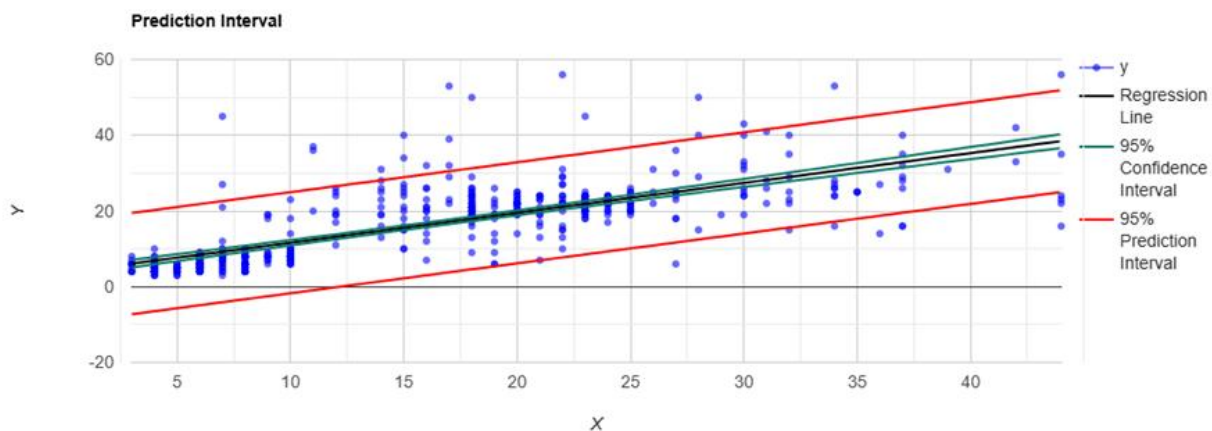**Figure 3:** BMI score of the male and female respondents.

Figure 4: Linear regression model for relationship between phone addiction with sleep and stress factors.

Variables	Male Respondents % (n=146)	Female Respondents (n=210)	Respondents (n=356)
Age	21.83	22	21.91
Academic Score	77	76	76.5
Sports Activity	51.61	11	57.11
Phone usage hours	5.26	4.83	5.04
Sleep duration hours	8.03	6.56	7.29
Father's Education	70.96	72.85	71.8
Mother's Education	32.25	44.28	38.26
Body Mass Index (Normal)	48.63	33.33	40.98

Table 1: Social demographic parameters of the respondents.

Smartphone Addiction	Male Respondents			Female Respondents		
	Good Sleepers	Poor Sleepers	Chi Square (P-value)	Good Sleepers	Poor Sleepers	Chi Square (P-value)
High Risk	1.248	0.574	4.3604(0.0368)	5.87	4.15	31.63 (0.0001)
Low Risk	1.739	0.8		13.69	9.68	
P value significant at (p < 0.05), PSQI<5 Good sleepers, PSQI>6 Poor sleepers						

Table 2: The chi square test of smartphone addiction with sleep quality.

Variables	R value[*]	r^2	Covariance
SAS-SV -PSS	0.668	0.44	-19.02
SAS-SV - PSQI	-0.648	0.04	-2.046
PSS- PSQI	0.272	0.01	6.56
*R value significant at p< 0.0001			

Table 3: The associations between smartphone addictions, sleep and stress parameters.

Discussion

The technological culture have now days ease life, whereas uncontrolled excessive usage of Smartphones, are steadily changing the behavior of youth and had potential for addiction like behaviour. Adolescences pass through different stages of development, hormones and physical change contribute in growth of healthy adults. The young adults are always surrounded by social factors of peer validation, social connection and experimental temperament, where Smartphones play most important role in their life. The long period of phone usage hours, online gaming, online shopping, social networking sites contribute to an obsessive impulse control disorder. The study observed more than 40% students were spending more than four hours on Smartphone, followed by 35% student population was spending more than 8 hours' time on Smartphone which is alarming signs for substance dependency (Fig. 1). This type of phone usage hours had been considered in phone addictions previous reports [17]. The young population is spending more time in virtual life and serious health issues are burdening society [20]. To understand the screen addiction behavior, emergence of baseline issues like impulsiveness, anxiety and affected cognitive domain are utmost important [18]. Screen addiction in young population shows association with socio-behavioral response pattern leading to increased stress in early stages of developing brain (Table1). The different studies performed in other parts of world reported addiction symptoms such as preoccupation, craving, tolerance, positive mood effects with use and lack of control which is supported the results of this study [19]. Technology addictions are near similar to other substance addictions, which had onset in young adulthood. Other studies also emphasized social isolation as response to phone addiction [20]. The study showed response of excessive preoccupation of phone addiction resulted in poor academic scores in the demographic profile. This type of response was common among previous studies performed on young population perusing education in school, colleges and Universities. Other parameters like physical activities and body mass index showed variation among male and female students (Fig. 3,4), the mediating role of gender on phone addiction is not determined, still the lack of fitness is again an underlying health issue which needs to be addressed in young females. The similar studies on phone addiction problems have considered other various issues in young people like social networks; cyber bullying and trolling which is associated with anxiety and increased stress [21].

The present study also showed the Smartphone addiction significantly affected the sleep and perceived stress at young stage (Table 2), the results showed poor sleepers were at high risk of phone addiction as compared to good sleepers and this type of results may be due to late night awakening and not getting proper sleep. The adolescents when fall into phone addiction follow late night awakenings disturbing the biological circadian cycle which in turn changes the sleep quality, the study analyzed poor sleepers are high risk of addiction in both genders male and female, this may affect mental health and had been established in other previous studies [22]. The constant surge of dopamine rush during addiction disorder raises steroid level, cortisol and serotonin ratio alters the cortico-hippocampal structure, which controls various cognitive functions like attention, verbal and visual-spatial domains and dysfunction the circadian rhythm [23]. The buildup stress induced by constant radiation increases serum nor epinephrine and cortisol affecting the anti-oxidative capacity of brain. The earlier studies show evidence that during addiction behavior the limbic stratium was hyper connected to the orbito frontal cortex and hypo connected to the precuneus, these alterations changes the behavior such as lack in motivation, attention and habit formation and affects emotional processing [24].

The female group was more affected with phone addiction which is similar to the study reports done on female students compared to young males, this was justified by female young adults taking no or minimal participation in sports or physical activity also affecting reduced sleep scores. The other associated factors may be related to similar studies on low parental control and family problems with phone addiction. The studies showed an increased pattern of perceived stress in phone addicted group which often relates to depression, sleep disorder and anxiety. Similar study based on mobile phone dependence also relates to social isolation and loneliness [25]. The female group also showed underweight body mass index and less participation in sports activity, the underlying health issues of female group, may be supported by their disturbed sleep and late-night awakenings [26].

The purpose of increasing screen time is online education, social media, gaming (online and offline gaming), recreation, socializing, listening to music, watching movies etc. [27]. During the onset of adolescence and young adulthood period has highest chances of screen addictions. The study finds a significant positive association of Smartphone addiction with sleep and perceived stress (Table 3, Fig. 4), as the disorder includes physiological and psychological symptoms, with pathogenesis of sleep and anxiety problems the study observes similar findings [28]. The previous studies signifies Smartphone addiction repetitively stimulates the neuro mechanism circuit of hyper activation, functional connectivity, volume reduction of brain, which disturbs the sleep cycle and may cause abnormal melatonin secretion, cerebral blood flow, heart rate, leading to physical and emotional dysregulation among children [29]. The appearance of anxiety, depression, sense of loss of time, anger issues, eating disorder, migraine, headache ocular discomfort are reported as symptom of mobile/screen addiction. This type of social behavior becomes addiction pattern not realized due to excessive usage of screens in daily life. The studies based on higher education students are necessary at present state to identify the behavior response and stressors stimulating the phone addiction [30].

Conclusion
The overall impact of phone addiction is slow but steady affecting the health and social living of young people, the results of random sampling and cross-section design may limit the subjective nature of findings. The study emphasizes key points like poor sleep, increased stress and low physical activity in youth. An early monitoring may prevent many neurological and psychological health issues among youth.

Conflict of Interest
The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Financial Disclosure
None.

Ethical Statement
The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore, was exempt.

Acknowledgment

None.

Consent To Participate

Written informed owner consent was obtained from all the masses.

Data Availability

The study data are available from the corresponding author upon reasonable request.

Author's Contribution

All authors read and approved of the final manuscript.

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